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(54) **OPTICAL DEVICE, OPTICAL SYSTEM OF OPTICAL APPARATUS, METHOD FOR MANUFACTURING OPTICAL DEVICE, METHOD FOR CALCULATING BIREFRINGENCE OF OPTICAL DEVICE, AND METHOD FOR JUDGING BIREFRINGENCE**

(57)Abstract:
PROBLEM TO BE SOLVED:To provide an optical element with a small birefringence rate and an optical system with a small aberration by calculating each amount of change in refractive index in the direction of two axes that orthogonally cross each other using a piezo optical constant being converted into a three-dimensional rectangular coordinates system and a one-axis stress.
SOLUTION:The known optical piezo optical constant of an optical element or an optical material for constituting a material for the optical element is converted into a piezo optical constant in an arbitrary three dimensional rectangular coordinates system. Then, a one-axis stress being given to the optical material along the direction of one coordinates axis of the three-dimensional rectangular coordinates system and each amount of change in a refractive index of two directions (X and Y directions) that cross orthogonally each other using a piezo optical constant being converted into the three-dimensional rectangular coordinates system are calculated, and the difference is obtained, thus obtaining birefringence viewed from a third direction (Z) and detecting a third direction (observation direction) where birefringence can be minimized. Then, a material is machined and the optical device is formed so that the direction where the amount of birefringence can be minimized coincides with the optical axis, thus constituting an optical system where aberration is small with the optical element.

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